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APPLICATION NO.	FILING DATE	FIRST NAMED INVENTOR	ATTORNEY DOCKET NO.	CONFIRMATION NO.
09/665,911	09/20/2000	Yasuhiko Nomura	001221	5447

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EXAMINER

LANDAU, MATTHEW C

ART UNIT	PAPER NUMBER
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2815

DATE MAILED: 07/15/2004

Please find below and/or attached an Office communication concerning this application or proceeding.

Office Action Summary

Application No.

09/665,911

Applicant(s)

NOMURA ET AL.

Examiner

Matthew Landau

Art Unit

2815

-- The MAILING DATE of this communication appears on the cover sheet with the correspondence address --
Period for Reply

A SHORTENED STATUTORY PERIOD FOR REPLY IS SET TO EXPIRE 3 MONTH(S) FROM THE MAILING DATE OF THIS COMMUNICATION.

- Extensions of time may be available under the provisions of 37 CFR 1.136(a). In no event, however, may a reply be timely filed after SIX (6) MONTHS from the mailing date of this communication.
- If the period for reply specified above is less than thirty (30) days, a reply within the statutory minimum of thirty (30) days will be considered timely.
- If NO period for reply is specified above, the maximum statutory period will apply and will expire SIX (6) MONTHS from the mailing date of this communication.
- Failure to reply within the set or extended period for reply will, by statute, cause the application to become ABANDONED (35 U.S.C. § 133). Any reply received by the Office later than three months after the mailing date of this communication, even if timely filed, may reduce any earned patent term adjustment. See 37 CFR 1.704(b).

Status

- 1) ☒ Responsive to communication(s) filed on 05 May 2004.
- 2a) ☒ This action is **FINAL**. 2b) ☐ This action is non-final.
- 3) ☐ Since this application is in condition for allowance except for formal matters, prosecution as to the merits is closed in accordance with the practice under *Ex parte Quayle*, 1935 C.D. 11, 453 O.G. 213.

Disposition of Claims

- 4) ☒ Claim(s) 1,3 and 5-10 is/are pending in the application.
- 4a) Of the above claim(s) _____ is/are withdrawn from consideration.
- 5) ☐ Claim(s) _____ is/are allowed.
- 6) ☒ Claim(s) 1,3 and 5-10 is/are rejected.
- 7) ☐ Claim(s) _____ is/are objected to.
- 8) ☐ Claim(s) _____ are subject to restriction and/or election requirement.

Application Papers

- 9) ☐ The specification is objected to by the Examiner.
- 10) ☐ The drawing(s) filed on _____ is/are: a) ☐ accepted or b) ☐ objected to by the Examiner.
Applicant may not request that any objection to the drawing(s) be held in abeyance. See 37 CFR 1.85(a).
Replacement drawing sheet(s) including the correction is required if the drawing(s) is objected to. See 37 CFR 1.121(d).
- 11) ☐ The oath or declaration is objected to by the Examiner. Note the attached Office Action or form PTO-152.

Priority under 35 U.S.C. § 119

- 12) ☐ Acknowledgment is made of a claim for foreign priority under 35 U.S.C. § 119(a)-(d) or (f).
- a) ☐ All b) ☐ Some * c) ☐ None of:
1. ☐ Certified copies of the priority documents have been received.
2. ☐ Certified copies of the priority documents have been received in Application No. _____.
3. ☐ Copies of the certified copies of the priority documents have been received in this National Stage application from the International Bureau (PCT Rule 17.2(a)).

* See the attached detailed Office action for a list of the certified copies not received.

Attachment(s)

- 1) ☐ Notice of References Cited (PTO-892)
- 2) ☐ Notice of Draftsperson's Patent Drawing Review (PTO-948)
- 3) ☒ Information Disclosure Statement(s) (PTO-1449 or PTO/SB/08)
Paper No(s)/Mail Date _____
- 4) ☐ Interview Summary (PTO-413)
Paper No(s)/Mail Date. _____
- 5) ☐ Notice of Informal Patent Application (PTO-152)
- 6) ☐ Other: _____

DETAILED ACTION

Claim Rejections - 35 USC § 103

The following is a quotation of 35 U.S.C. 103(a) which forms the basis for all obviousness rejections set forth in this Office action:

(a) A patent may not be obtained though the invention is not identically disclosed or described as set forth in section 102 of this title, if the differences between the subject matter sought to be patented and the prior art are such that the subject matter as a whole would have been obvious at the time the invention was made to a person having ordinary skill in the art to which said subject matter pertains. Patentability shall not be negated by the manner in which the invention was made.

Claims 1, 5-7, and 9 are rejected under 35 U.S.C. 103(a) as being unpatentable over Hata in view of Hatano et al. (US Pat. 5,998,810, hereinafter referred to as Hatano).

In regards to claims 1 and 9, Figures 3A-G of Hata disclose an active layer 4 composed of a nitride based semiconductor (InGaN); a cladding layer 55 formed on said active layer, composed of a n-type nitride based semiconductor (AlGaN) (column 7, lines 59-62), and having a flat portion and a ridge portion formed on the flat portion; and a first current blocking layer 77 formed on said flat portion and on sidewalls of said ridge portion of said cladding layer and composed of a high-resistive nitride based semiconductor (AlGaN) containing impurities (Mg); and a second current blocking layer 66 formed on said first current blocking layer and composed of a p-type nitride based semiconductor (AlGaN) (column 8, lines 18-20); wherein the cladding layer is composed of $\text{Al}_{0.1}\text{Ga}_{0.9}\text{N}$; and wherein the first current blocking layer is composed of $\text{Al}_{0.15}\text{Ga}_{0.85}\text{N}$, which has a larger Al composition ratio than that of the cladding layer. The difference between Hata and the claimed invention is the impurities containing at least one of zinc, beryllium, calcium, and carbon. Hatano discloses a p-type AlGaN layer 44 containing Mg and carbon impurities (column 10, lines 20-22). In view of such teaching, it would have been obvious to the ordinary artisan at the time the invention was made to modify the invention of

Hata by including carbon impurities in the first current blocking layer for the purpose of forming a deep acceptor level thereby compensating the residual donors (column 10, lines 24-29 of Hatano).

In regards to claims 5 and 6, Hata discloses the thickness of said first current blocking layer 77 is 1 micron (column 8, lines 23-25).

In regards to claim 7, Hata discloses the thickness of the flat portion of said cladding layer 55 is 0.1 (column 8, lines 10-15).

Claim 3 is rejected under 35 U.S.C. 103(a) as being unpatentable over Hata in view of Hatano as applied to claim 1 above, and in further view of Johnston, Jr. et al (US Pat. 4,888,624) hereinafter referred to as Johnston.

A further difference between Hata and the claimed invention is the first current blocking layer with a resistance value of not less than $1.5 \Omega\text{-cm}$. Johnston discloses a current blocking layer 20 having a resistivity of at least $1 \times 10^6 \Omega\text{-cm}$ (see column 6, lines 34-40). In view of such teaching, it would have been obvious to the ordinary artisan at the time the invention was made to further modify the invention of Hata to include a current blocking layer with a resistivity value greater than $1.5 \Omega\text{-cm}$ for at least the purpose of increasing the effectiveness of the current blocking layer.

Claim 8 is rejected under 35 U.S.C. 103(a) as being unpatentable over Hata in view of Hatano as applied to claim 7 above, and in further view of Hiroyama et al.

A further difference between Hata and the claimed invention is the flat portion of the cladding layer having a thickness not more than $0.08\text{ }\mu\text{m}$. Figure 1 of Hiroyama et al. discloses a cladding layer 7 with a flat portion 7a and a ridge portion 7b, whereby the thickness t of flat portion 7a is selected to be not greater $0.08\text{ }\mu\text{m}$ (see column 10, lines 22-27). In view of such teachings, it would have been obvious to the ordinary artisan at the time the invention was made to further modify the invention of Hata by decreasing the thickness of the flat portion to a value not more than $0.08\text{ }\mu\text{m}$ for the purpose of increasing the real refractive index difference of the active layer between the region under the ridge portion and the region under the flat portion.

Claim 10 is rejected under 35 U.S.C. 103(a) as being unpatentable over Hata in view of Hatano as applied to claim 1 above, and further in view of Hirata.

A further difference between Hata and the claimed invention is said cladding layer having a recess on said flat portion along both sidewalls of said ridge portion; and said first current blocking layer is embedded in said recess of said cladding layer. Figure 2A of Hirata discloses a light emitting device wherein a cladding layer 4 has a recess 4b along both sidewalls of a ridge portion 4a and a current blocking layer 8 is embedded in said recess. In view of such teaching, it would have been obvious to the ordinary artisan at the time the invention was made to further modify the invention of Hata by using the recess portion of Hirata for the purpose of independently controlling current confinement and light confinement, thereby ensuring sufficient area for the saturable absorbing region (see Abstract and col. 3, lines 1-25 of Hirata).

Response to Arguments

Applicant's arguments filed May 5, 2004 have been fully considered but they are not persuasive.

In response to Applicant's arguments that "Hata has never disclosed or taught a second current blocking layer. Hata discloses reference 66 to be a surface protection layer", whether or not layer 66 is called a current blocking layer or a surface protection layer does not affect the rejection set forth above. The particular label used is merely a way to describe a particular function of the layer. While layer 66 is referred to as surface protection layer, it still blocks at least some current since it has the same conductivity type and a similar composition as current blocking layer 77. Therefore, layer 66 can also be considered a current blocking layer. In response to Applicant's argument that "layers 66 and 77 as disclosed in Figure 3 of Hata are both p-type layers, not high resistive layers", Applicant has not specifically defined "high-resistive". Therefore, layers 66 and 77 of Hata, which inherently have a resistance, can be considered "high-resistive" as claimed. In response to Applicant's argument that "layer 44 of Hatano et al. is a cladding layer, not a current blocking layer", Hatano is relied upon for the teaching of a p-type AlGaIn layer containing Mg and carbon impurities. The function of that layer is not germane to the rejection set forth above.

Conclusion

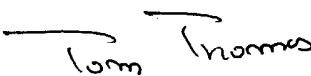
Applicant's amendment necessitated the new ground(s) of rejection presented in this Office action. Accordingly, **THIS ACTION IS MADE FINAL**. See MPEP § 706.07(a). Applicant is reminded of the extension of time policy as set forth in 37 CFR 1.136(a).

A shortened statutory period for reply to this final action is set to expire THREE MONTHS from the mailing date of this action. In the event a first reply is filed within TWO MONTHS of the mailing date of this final action and the advisory action is not mailed until after the end of the THREE-MONTH shortened statutory period, then the shortened statutory period will expire on the date the advisory action is mailed, and any extension fee pursuant to 37 CFR 1.136(a) will be calculated from the mailing date of the advisory action. In no event, however, will the statutory period for reply expire later than SIX MONTHS from the date of this final action.

Any inquiry concerning this communication or earlier communications from the examiner should be directed to Matthew C. Landau whose telephone number is (571) 272-1731.

The examiner can normally be reached from 8:30 AM - 5:30 PM. If attempts to reach the examiner by telephone are unsuccessful, the examiner's supervisor, Tom Thomas can be reached on (571) 272-1664. The fax phone numbers for the organization where this application or proceeding is assigned are (703) 872-9306 for regular communications and (703) 872-9306 for After Final communications.

Any inquiry of a general nature or relating to the status of this application or proceeding should be directed to the receptionist whose telephone number is (703) 308-0956.


TOM THOMAS
SUPERVISORY PATENT EXAMINER
TECHNOLOGY CENTER 2800

Matthew C. Landau

Examiner

July 12, 2004